

WE CLAIM:

1. An optical transmitter comprising:  
 a Mach-Zehnder optical modulator having an RF input port, a bias voltage input port, an optical carrier input port and an optical output port;  
 a wavelength division multiplexer (WDM) having two input ports and an output port, the output port coupled to said optical carrier input port of said Mach-Zehnder optical modulator; and  
 two optical carrier sources having different wavelengths coupled to said input ports of said WDM.

2. The optical transmitter as recited in claim 1, further including a bias control circuit coupled to said bias voltage input port.

3. The transmitter as recited in claim 1, wherein said bias control circuit includes a pair of photodetectors and a wavelength division multiplexer (WDM).

4. The transmitter as recited in claim 3, wherein said WDM and said pair of photodetectors are coupled to said optical output port of said Mach-Zehnder modulator.

5. The optical transmitter as recited in claim 1, wherein said two optical carrier sources are provided by lasers having different wavelengths.

6. The optical transmitter as recited in claim 4, further including means for dithering the Mach-Zehnder modulator bias voltage.

7. The optical transmitter as recited in claim 1, further including an optical amplifier coupled to said output port of said Mach-Zehnder modulator.

8. An analog demodulator comprising:  
 a wavelength division multiplexer (WDM) having an input port for receiving optical signals from a single optical link having multiple wavelengths and separating the wavelengths at its output ports;  
 a plurality of photodetectors said photodetectors coupled to said output ports of said WDM such that each photodetector is coupled to an output port of said WDM having a different wavelength signal; and  
 a summing junction for summing the outputs from said photodetectors.

1 9. The optical demodulator as recited in claim 8 further including an optical  
2 amplifier for amplifying the input signals to said demodulator forming an optical receiver.

1 10. An optical system comprising:  
2 an optical transmitter, said optical transmitter including an optical modulator for  
3 modulating an RF input signal onto an optical carrier signal having multiple wavelengths and  
4 defining an RF modulated optical signal;  
5 an optical receiver for demodulating said RF modulated optical signal and  
6 providing an RF output signal; and  
7 an optical link connecting said optical transmitter and said optical receiver.

1 11. The optical system as recited in claim 10, wherein said optical link is a fiber  
2 optic cable based link.

1 12. The optical system as recited in claim 10, wherein said optical link is in free  
2 space.

1 13. The optical system as recited in claim 10, wherein said optical modulator is a  
2 Mach-Zehnder modulator having an RF input port, a bias voltage input port, an optical carrier  
3 input port, and an optical output port.

1 *Sub 817* 14. The optical system as recited in claim 13, wherein said optical transmitter  
2 includes a wavelength division multiplexer (WDM) and said optical carrier signal having  
3 multiple wavelengths is formed from a plurality of carrier signals having different wavelengths  
4 for providing an optical carrier signal to said optical carrier input port of said Mach-Zehnder  
5 modulator, said optical transmitter also including a plurality of sources of carrier signals at  
6 different wavelengths which are applied to said WDM.

1 15. The optical system as recited in claim 14 further including a bias control  
2 circuit, said bias control circuit applied to said bias voltage input port.

1 16. The optical system as recited in claim 15, wherein said bias control circuit  
2 includes a wavelength division multiplexer (WDM) and a pair of photodetectors.

1 17. The optical system as recited in claim 16, wherein said WDM and said pair  
2 of photodetectors are coupled to said output port of said Mach-Zehnder modulator.

1 18. The optical system as recited in claim 17, wherein said optical receiver  
2 includes a wavelength division multiplexer (WDM) for receiving said RF modulated optical  
3 signal and demultiplexing said RF modulated optical signal into separate wavelength signals  
4 and a plurality of photodetectors coupled to said WDM for photodetecting the separate  
5 wavelength signals separately and generating corresponding multiple photodetector current  
6 signals, said optical receiver also including a summing junction for summing said  
7 photodetector currents.

1 19. The optical system as recited in claim 18, further including one or more  
2 optical amplifiers.

1 20. The optical system as recited in claim 19 wherein said one or more optical  
2 amplifiers are connected to one or the other of said optical transmitter and said optical  
3 receiver.

1 21. The optical system as recited in claim 20, including at least two optical  
2 amplifiers, one optical amplifier connected to said optical transmitter and one optical amplifier  
3 connected to said optical receiver.

1 ~~22. An optical transmitter comprising:~~  
2 a Mach-Zehnder optical modulator having an RF input port, a bias voltage input  
3 port, an optical carrier input port and an optical carrier output port; and  
4 means for providing two optical sources having different wavelengths.

1 23. The optical transmitter as recited in claim 22, wherein said providing means  
2 includes a single laser which produces two optical carriers having different wavelengths.

1 24. The optical transmitter as recited in claim 22, wherein said providing means  
2 includes a wavelength division multiplexer and two optical carrier sources.